CRISPR/Cas9-mediated gene editing of Hematopoietic stem and progenitor cells for Friedreich's ataxia

Grant Award Details

CRISPR/Cas9-mediated gene editing of Hematopoietic stem and progenitor cells for Friedreich's ataxia

Grant Type: Therapeutic Translational Research Projects

Grant Number: TRAN1-13983

Investigator:

Name:	Stephanie Cherqui
Institution:	University of California, San Diego
Type:	PI

Award Value: $4,846,579

Status: Pre-Active

Grant Application Details

Application Title: CRISPR/Cas9-mediated gene editing of Hematopoietic stem and progenitor cells for Friedreich's ataxia

Public Abstract:

Translational Candidate

Autologous human CD34+ HSPC of patients with Friedreich's ataxia, modified ex vivo using CRISPR/Cas9 to remove the GAA expansion mutation in frataxin

Area of Impact

Friedreich's ataxia (FRDA) for which there is no effective treatment available

Mechanism of Action

The proposed therapy intervention is intended to impact the target indication of Friedreich's ataxia via autologous transplantation of CD34+ HSCs ex vivo gene-corrected using CRISPR/Cas9 technology. The gene-corrected HSC progeny will differentiate into macrophages in injured tissues and transfer functional frataxin to disease cells such as neurons in the brain, and cardiac cells in the heart. This transfer of functional frataxin to endogenous tissue cells leads to long-term tissue preservation.

Unmet Medical Need

FRDA causes neurodegeneration leading ultimately inability to walk as well as heart abnormalities leading to premature death. Gene-corrected HSPC transplantation may represent a one-time life-long therapy that may prevent the neurologic and cardiac complications in FRDA.

Project Objective

Readiness for safety and manufacturing and Pre-IND

Major Proposed Activities

- Pilot efficacy and safety studies for FDA-required studies readiness for a future clinical trial
- Manufacturing development for Good manufacturing practice-compatible scale-up process readiness
- Clinical design of the future clinical trial and pre-IND submission

Statement of Benefit to California:

Though patients with Friedreich's ataxia in California and the United States are rare, the technology to undergo gene-modified HSCs for autologous transplantation is cutting edge research and utilizes the California resources albeit scientist and laboratories of UCSD, City of Hope, and other CRO organizations in California. Once this technology is studied in the Friedreich's ataxia population, the technology can be used in other applications of mitochondrial disorders.
